

fractions and their modifications similarly separated from malt and wort. Ultra-centrifuging and electrophoresis, which had previously been employed with success to barley and malt fractions, are more complicated when applied to worts and beers. The amperometric titration was applied to the determination of sulphhydryl groups in the proteins. Protein haze in beer, which is increased by oxidation, is in part associated with the β -globulin of barley, which contains reactive sulphur. The possibility of distinguishing malt from hop tannin by means of ultra-violet spectrophotometry is indicated. B. D. Hartong, J. H. St. Johnston and others report their work on protein and protein-tannin precipitates which occur during brewing operations and in beer storage. Communications by E. C. Barton-Wright and the Wallerstein Laboratory (New York) workers, on yeast nutrition and factors controlling fermentation, are perhaps the remaining outstanding papers. But there are many more, and most of the work reported was previously unpublished. An admirable review of proteins in brewing is furnished by H. Lundin, in which he discusses the formation of adaptive enzymes and A. I. Virtanen's opinion that much cell protein functions as enzymes or apoenzymes.

The part of the volume devoted to barley research includes eight communications from European countries covering breeding and agricultural aspects. The symposium on production of sterile beer by means other than pasteurization includes five papers involving work on irradiation methods, aerosols for cleaning air, etc.

Most of the papers are in English, a few in French, and all summaries are in English, French and German. There is no general index; but references appear at the end of each communication. This book is indispensable to the research and scientific worker in any of the fields covered.

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FAIRY WRENS OF AUSTRALIA

The Fairy Wrens of Australia

Blue Birds of Happiness. By Neville W. Cayley. Pp. viii+88 (23 plates). (Sydney and London: Angus and Robertson, Ltd., 1949.) 15s.

THIS is a popular account of a group of birds known in Australia as fairy wrens. They have, however, no connexion with the true wrens, but are closely related to the warblers and are placed in the Malurinae, a sub-family of the Muscicapidae, which includes the Turdidæ and Sylviidæ, etc. Except for one species in New Guinea, the sub-family is confined to Australia.

The females are all rather dull-coloured, brown above and white below, but the males are a striking combination of colours; some are a beautiful mixture of blue and purple with a little brown and white; one species is black and white, while in another the blue of the back is replaced by red; and in a species confined to northern Australia the coloration resembles the female, except for the blue tail and purple crown. The author recognizes twelve species which in the present work he places in six genera, although in a previous volume he only admitted two genera, *Malurus* and *Rosina*, this last genus being for the purple-crowned fairy wren, *R. coronata*, of Northern

Australia. Judging by the coloured plates, I consider the first arrangement is right, if indeed all the species should not be in *Malurus*.

Mr. N. W. Cayley has devoted much time to field study of the changes in plumage of these birds and has come to the conclusion that the male moults direct from the juvenile plumage into that of the adult. After the breeding season, a non-breeding dress is assumed; but, when the birds are about three years old, the assumption of the non-breeding dress is omitted, and the males moult straight into the usual full plumage. According to the author, moreover, the colour of the plumage increases in brightness as the bird grows older. These observations do not appear to have been made with marked birds, and, according to Lack, the average life of a robin is one and a half years, so that it is unlikely that a fairy wren lives much longer.

Details are given of the discovery of each species, and it is interesting to note that, out of the twelve species here recognized, seven were first described, and in some cases also discovered, by John Gould. Some of the fairy wrens are widely distributed, but their range is not continuous and a number of local races have been described. The best-known member of the genus is *Malurus cyaneus*, which is common in gardens and shrubberies even in the middle of cities and is everyone's favourite. The display of the male is described, and, what with the positions it assumes and the bird's bright coloration, it must be very striking. Throughout the genus the same type of nest is constructed, a dome-shaped structure with an entrance at one side protected by a hood. Usually the nest is placed on or near the ground, but where cats abound the birds have learnt to build their nests out of reach.

Though not related, the emu wrens (*Sipiturus*) are included in the book. They are some of the smallest birds found in Australia, brown in colour with heavy streaks on the mantle, and in the males the throat is blue. But the most striking feature of the bird is its tail, which is composed of six feathers (an unusual number), the two middle ones being the longest. Each feather is decomposed and spiny. The early settlers saw in these feathers a resemblance to the feathers of the emu, hence the name emu wren. The genus contains but three species, one inhabiting the Mallee country of Victoria and South Australia, and the other two being widely but very locally distributed in the dry and swampy heath lands of the coastal belt of eastern and western Australia. They are shy birds and seldom take wing, creeping and hopping through the undergrowth in pairs or small parties.

There are nine coloured plates, each figuring the male and female of two different species. In addition to the birds, there are pleasing drawings of typical bright-coloured flowers found in the birds' haunts, and, after the fashion of John Gould, the author gives the names of the flowers, which adds much to the interest of the book. The drawing of the birds is good and the colours appear to be fairly accurate; but the reproduction of the plates is not so pleasing. There are twenty excellent photographs of birds, nests and types of country in which they are found. It is sad to relate that since the book was published the author has died. Neville Cayley has probably done more than anyone to popularize the study of birds in Australia, and his "What Bird is That?" is one of the best field books published.

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